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Attorney Docket No.: 003364P035

## IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

#18  
6.27.34

In Re Application of:

Il-Ki Woo, et al.

Serial No.: 09/494,211

Filed: January 25, 2000

For: LITHIUM SECONDARY BATTERY

Examiner: Dove, T.

Art Unit: 1745

DECLARATION PURSUANT TO 37 C.F.R. § 1.132

Honorable Commissioner  
for Patents  
Washington, D.C. 20231

Dear Sir:

I, Sang-Won Lee, hereby declare that:

1. I am a citizen of Korea.
2. I currently reside at San 24-1, Seongseong-dong, Cheonan-si, Chungcheongnam-do, Korea.

3. I have received a bachelor's degree in metallurgical engineering from Korea University in 1990 and a master's degree in materials science and engineering from Korea Advanced Institute of Science and Technology in 1992.

4. I am currently an employee of Samsung SDI Co., Ltd., Suwon-Si, Kyungki-do, Korea.

5. I have been employed by Samsung from 1992 to present.

6. My current title at Samsung is Senior Researcher.

7. I am a co-inventor of the above-identified patent application.

8. Samsung is the assignee of the above-identified patent application.

9. I have reviewed U.S. Patent No. 5, 686,203 issued to Idota et al (Idota).

The Examiner cited Idota against the claims of the above-identified application.

10. I have reviewed U.S. Patent Nos. 5,601,950, issued to Yamahira et al (Yamahira). The Examiner has cited Yamahira against the claims of the above-identified application

11. I have reviewed U.S. Patent No. 5,589,299, issued to Yamada et al (Yamada). The Examiner cited Yamada against the claims of the above-identified application.

12. None of Yamada, Idota, or Yamahira teach or suggest the desirability of a copper-based alloy foil produced by a plating process into a foil shape. The benefits of a copper-based alloy foil produced by a plating process into a foil shape are set out below.

13. A thin alloy foil with a thickness of 20 $\mu$ m or less, while having good strength and other physicochemical properties, can only be prepared by a plating process. Physiochemical property differences between a foil made by a plating process and a foil made by a rolling method which are known foil preparation methods are as follows:

	foil made by a plating process	foil made by a rolling method
Tensile strength	Tensile strength is not deteriorated even after preparation of negative electrode.	Tensile strength is abruptly deteriorated after preparation of negative electrode.
Elongation	Approximately twice higher than foil made by rolling method.	Low
Variation of Tensile strength with time lapse	Variation of tensile strength does not occur since the foil preparation is not a mechanical process.	Variation of tensile strength is large even at room temperature, since remaining stress which is generated during mechanical process of foil preparation is present.
Workability	The foil is difficult to tear since stress is distributed even if a defect portion occurs.	Stress is concentrated on a defect portion of foil which is easy to tear at defect portion.
Forming into extra-wide width	Easy	Difficult

Yield	High	Low (foil edge is damaged during rolling)
Surface control	Easy	Difficult
Preparation process	Easy	Complicated
Forming into thin film of thickness of 10 $\mu$ m	Easy	Difficult

The foil prepared by a plating process has good tensile strength and elongation, and thus an electrode including the foil prepared by a plating process is not broken during pressing and winding of the electrode. On the contrary, the foil prepared by a rolling process has a reduced tensile strength and elongation, and thus the foil is easily broken during preparation of an electrode. Therefore, a thin alloy foil with improved tensile strength and elongation, which are important properties necessary for a current collector, can be prepared through a plating method.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the above-identified application or any patent issued thereon.

Respectfully submitted,

Dated: June 12, 2003

Lee Sang Won  
Sang-Won Lee

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